MAUL

OPERATION MANUAL

fxpansion

Table of Contents

1 Introduction

Maul is a multiband distortion/overdrive effect with a multitude of creative modulation possibilities using the powerful TransMod modulation system.

Audio signal path

Maul features 3 drive stages which can each be switched to one of 32 distortion types. While the 3 frequency bands are arranged in a parallel multi-band configuration by default, they can be used as 3 distortion stages arranged serially, acting on the whole frequency range, or as a single distortion stage.

When in Multi (parallel) mode, each drive stage can act on a filtered portion of the input signal. The frequency bands of each drive stage can overlap. The Low drive stage is isolated with a lowpass filter, the Mid drive stage with a bandpass filter, and the High drive stage with a highpass filter. The cutoff frequency of each drive stage can be freely swept throughout the frequency spectrum in realtime, via direct control or via the TransMod modulation system.

Each drive stage and the master output feature a switchable saturation circuit, while each drive stage also features a transient adjustment control and a post-distortion tone filter switchable between lowpass, bandpass and highpass modes for adjusting the aggression of the output.

TransMod modulation system

Maul's TransMod modulation system allows you to modulate most parameters within the plugin by the built in LFOs, envelope follower and sample & hold, as well as by incoming MIDI note pitch/ velocity, noise and a random generator.

MIDI control and host automation

Maul features a variety of MIDI control options which are described in the MIDI functions section.

Using MIDI CCs, it is possible to:

- Adjust Maul parameters' initial values
- Adjust parameter modulation depths for individual parameters and TransMod modulation sources

You can additionally use MIDI notes for a variety of different functions.

In addition to MIDI control, it is possible to automate Maul's parameters with your host's built-in automation features.

1.1 Launching and controlling Maul

Using Maul as an audio insert effect

In most cases, Maul should be launched as an insert effect, although in many hosts it may not be possible to route MIDI notes and/or MIDI CCs to an insert plugin. It is still possible to use your host's built-in automation features to control Maul - all parameters are exposed to the host automation system.

Using Maul with MIDI control

Maul features extensive MIDI control features for interacting with its parameters in real time.

MIDI control with Maul is *host-dependent*. Some hosts make it very easy to route MIDI notes and/or continuous controllers to an effect plugin, but in some it may be necessary to run Maul as an instrument or MIDI-controlled effect on a separate channel and route the desired audio to the input. Please consult your host's documentation for full details of its MIDI implementation for audio effect plugins.

Adjusting parameters

Rotary controls

Click and drag up/down the main part of the rotary control.

Drop-down menus

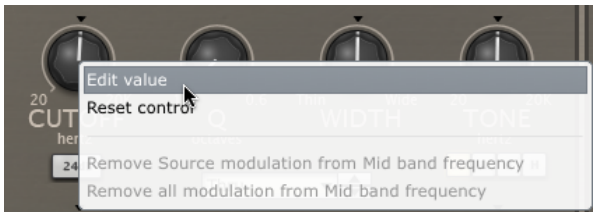
Drop-down menus are indicated by a downwards triangular arrow icon. Click the drop-down box in order to display the menu.

Maul's rotary controls are also used for setting modulation depths in the TransMod system.

Context menus

Context menus exist in several areas on the Maul interface. They are invoked by right-clicking (you can also CTRL-click on Mac).

Editing a value manually using the control context menu



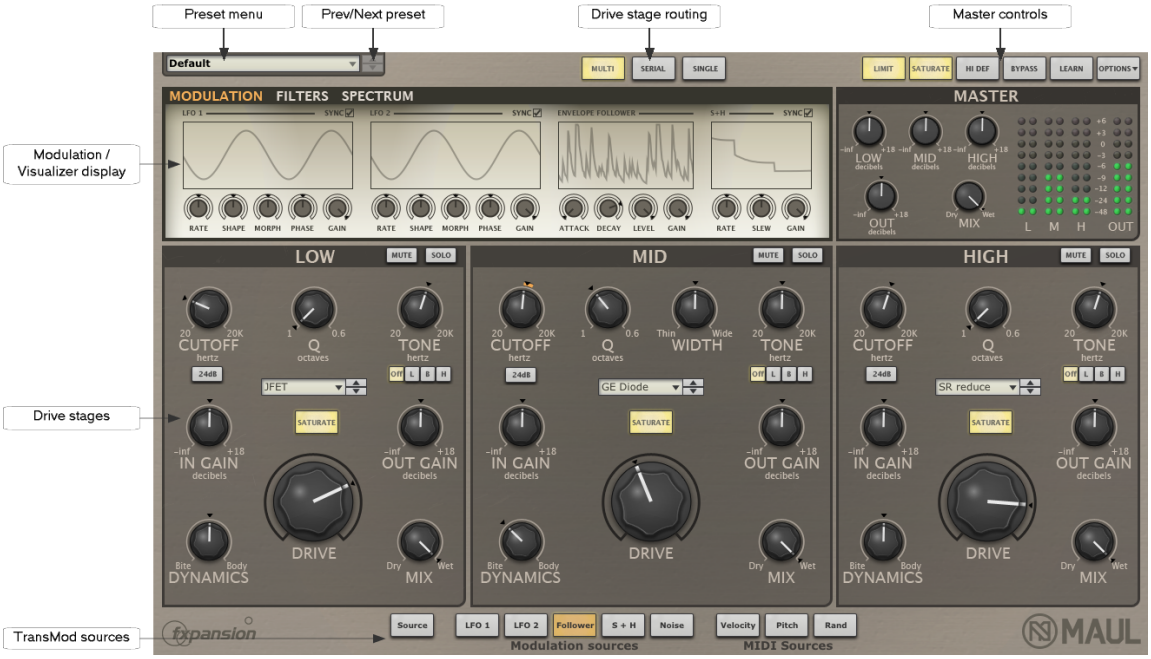
Right-click on any synthesis parameter to display the control context menu, which contains the Edit value function for entering values via the keyboard.

This menu also contains the **Reset control** function to reset a parameter to its default value and additional functions related to the TransMod modulation system.

Resetting a control to its default value

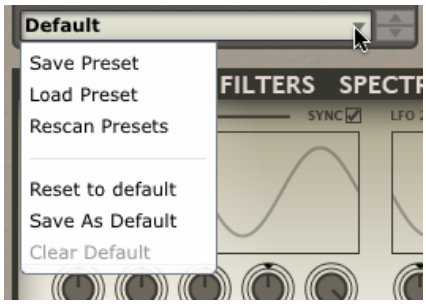
Double-click a control to reset it to its default value. This is also possible using the control context menu with the **Reset control** function.

2 Maul parameter and algorithm reference



Preset controls

Preset menu



This drop-down menu displays all available presets of the relevant type, arranged in category sub-menus, as well as the **Save preset**, **Load preset**, and **Rescan presets** functions.

Save preset

This function prompts you for a filename in order to save the current settings to disk. It is recommended that you save presets to the default folder that is shown so that they can easily be reloaded using the preset picker menu.

Load preset

This function allows you to browse to and load a preset from any location.

Rescan presets

The **Rescan presets** function scans the preset location for new presets you may have copied there since you launched Maul.

Reset to default

This function resets the state of Maul to its default settings.

Save As default

This function allows you to set the current state of Maul as the default settings, meaning that they are recalled when Maul is launched as a plugin and when using the **Reset to default** funtion.

Clear default

This function clears the current user-defined default if it exists, meaning that the factory default settings are used as the defaults.

Prev/Next preset

These buttons sequentially step backward/forward through the current preset category.

Drive stages

Maul features 3 Drive stages: Low, Mid and High. See the next section for full details of their operation.

Drive stage routing

Maul's 3 drive stages can be used in 3 configurations:

Multi (Parallel)

This is the default configuration. Each of the 3 drive stages operates in parallel on the input signal. Using the Frequency cutoff controls, each stage can operate on a specific range of the frequency spectrum.

Serial

In Serial mode, each drive stage operates on the incoming audio in series - one after another. The Frequency and Q settings (as well as the Width control in the Mid stage) are not available in this mode - each drive stage operates on the entire signal feeding into it.

Single

In Single mode, only the Mid stage is operational - the other 2 stages are disabled. It operates on the entire frequency spectrum - the Cutoff, Q and Width controls are unavailable.

Modulation/Visualizer display

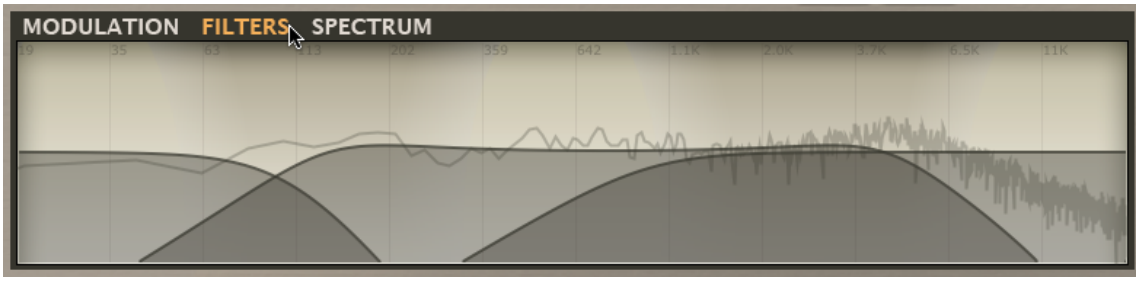
The Modulation/Visualizer display screen at the top-right of Maul's interface can be switched between 3 views.

Modulation

The Modulation view shows the controls for Maul's internal modulation devices: 2 LFOs, an envelope follower and a sample & hold. The main parameters for these devices can themselves be modulated via the TransMod system.

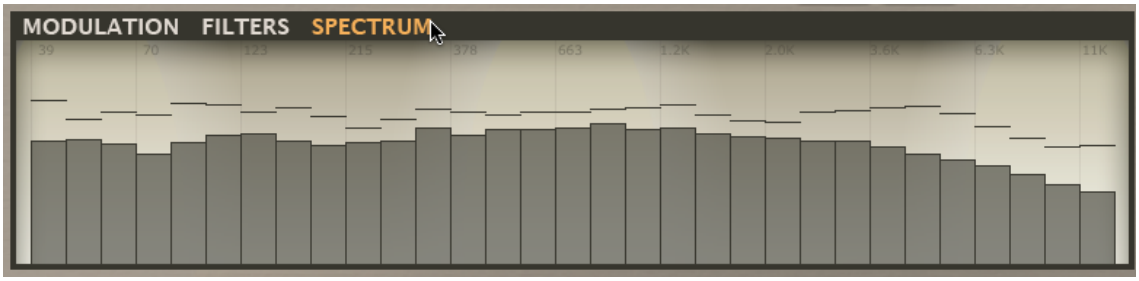
Each modulation device features an individual Visualizer display. The nature of each screen varies according to the function of the module.

Filters



Clicking the Filters tab switches the display to Filters mode, which shows a representation of the filter responses of the 3 drive stages. A realtime display of the amplitude of frequencies across the spectrum in the processed output signal is overlaid on the filter response curves.

Spectrum



Click the Spectrum tab to switch to the Spectrum display. This view shows a 32-band graphic analyser of the frequency spectrum in the processed output.

Master controls

Out Gain

This control adjusts the overall output level of Maul, useful for attenuating the gain added by its drive stages.

Mix

The **Mix** control sets the balance between the original input signal (towards the left of the control) and the processed signal (towards the right of the control).

Limit

Activating the **Limit** button engages a soft limiter on Maul's output. Note that the signal can still exceed 0db if it contains very fast attacks.

Saturate

The Master section's **Saturate** button activates a saturation circuit which is applied to the entire output signal. The saturation behaviour is dependent on the signal level. Note that this function is not a peak clipper - the signal can still exceed 0dB.

Hi Def

Enabling the **Hi Def** button results in processing audio internally at a higher sample-rate, minimising aliasing artifacts. The sound quality is better but comes at the expense of higher CPU usage.

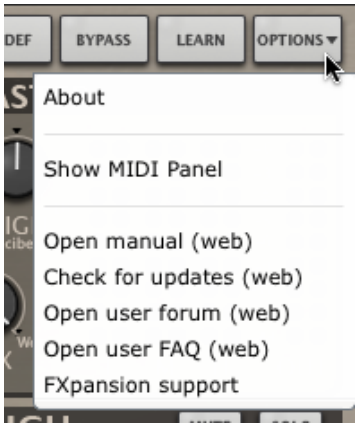
Bypass

Click this button to bypass Maul, so that the input signal is passed to the output unaffected.

Learn

This button activates MIDI Learn mode, which allows you to map MIDI CCs (continuous controllers) to Maul's parameters.

Options Menu



About

This function displays Maul's version number and credits listing.

Show MIDI Panel

This function allows you to set the MIDI channels used for MIDI note input in Maul.

Open manual

This function opens the Maul online manual in your OS's default web browser.

Check for updates

This function checks the FXpansion website for any available Maul software updates.

Open User forum, Open User FAQ, FXpansion support

These functions open the Maul forum, FAQ and FXpansion support page in your default browser.

2.1 Maul Drive stages

Each of Maul's 3 drive stages features a very similar set of controls.

Filtering functions: Cutoff, Q, 24dB (all stages), Width (Mid stage only)

The filtering functions are available only in **Multi** (parallel) mode, and are used to determine the frequency band affected by each drive stage. Unlike the **Tone** function described below, these filtering functions are applied prior to the drive circuit in each drive stage.

If the **Cutoff** parameter is swept via modulation functions, a MIDI CC or host automation, the drive stage effectively acts as a swept resonant filter with an overdrive section after it in the signal path.

Each filter features a 12 dB per octave slope by default. This can be switched to a 24 dB per octave response by activating the **24dB** button.

Low stage: Lowpass

In the Low drive stage, the **Cutoff** control adjusts the cutoff frequency of a lowpass filter. The **Q** control adjusts the amount of emphasis around the cutoff frequency.

Mid stage: Bandpass filter

In the Mid drive stage, the **Cutoff** control adjusts the centre frequency of a bandpass filter. The **Q** control adjusts the amount of emphasis around the centre frequency, while the **Width** control adjusts the bandwidth of the filter.

High stage: Highpass

In the High drive stage, the **Cutoff** control adjusts the cutoff frequency of a highpass filter. The **Q** control adjusts the amount of emphasis around the cutoff frequency.

Drive Type

This selector allows you to choose between the 32 available distortion algorithms, which are described in the next section.

Switch the selector to the 'Thru' setting to leave the signal passing through the stage unaffected by the distortion circuit. The other functions in the drive stage such as the **Dynamics**, **Saturate** and **Tone** functions can still be applied.

Drive

The **Drive** control adjusts the amount of distortion applied by the drive stage.

Saturate

Activating the **Saturate** button enables the drive stage's saturation function.

The saturation behaviour is dependent on the level of the input signal. Note that this function is not a peak clipper - the output signal can still exceed 0dB depending on peaks in the input signal and further gain introduced by the **Drive** and **Dynamics** functions.

Dynamics

The **Dynamics** control offers a simple but powerful transient-shaping control which is applied before the distortion circuit. Towards the 'Bite' setting, attack transients are emphasized while sustain portions of the transient are de-emphasized. Towards the 'Body' setting, the opposite occurs: attacks in transients are de-emphasized while the sustain portion is emphasized. At the centre setting of 50%, there is no direct adjustment of incoming transients using this function (although transients can still be affected by the drive and saturation algorithms).

Tone

This is a switchable Lowpass/Bandpass/Highpass filter with a cutoff frequency adjustable between 20Hz and 20kHz using the **Tone** control. The Tone filter is applied to the output of the drive stage, after the **Drive** amount has been applied.

Switch between Lowpass, Bandpass and Highpass modes using the **L**, **B** and **H** buttons underneath the **Tone** control. To disable the Tone filter entirely, click the **Off** button.

In Gain

The **In Gain** control adjusts the level of the signal entering the drive stage. The level can be adjusted between -inf dB and +18dB.

Out Gain

The **Out Gain** control adjusts the level of the signal leaving the drive stage. The level can be adjusted between -inf dB and +18dB.

Mix

The **Mix** control adjusts the balance between the incoming signal (Dry) and processed output (Wet) of the drive stage.

Mute, Solo

Each drive stage features a **Mute** and **Solo** button for removing it from or isolating it within the processed output.

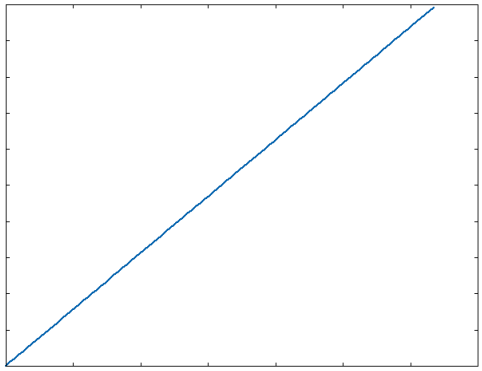
2.2 Maul distortion algorithms

Each drive stage in Maul features 32 different algorithms with which to process the incoming signal, selected with the **Drive Type** drop-down menu described in the previous section.

About the graphs

The graphs in this section represent the waveshaping response of most of Maul's algorithms. These do not make sense in the context of which some algorithms work, such as the Ring Mod and Digital algorithms.

The x-axis of each graph represents time, while the y-axis represents amplitude. With no processing applied (with the **Drive Type** set to 'Thru'), the waveshaping response can be represented by the graph to the right.

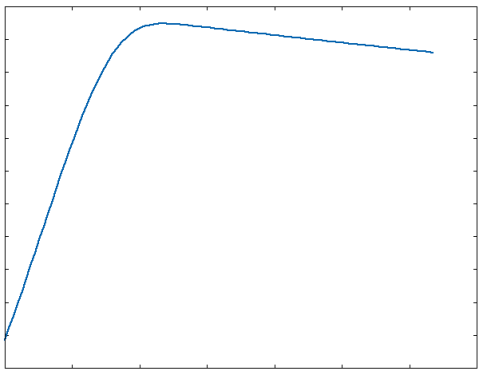


Thru

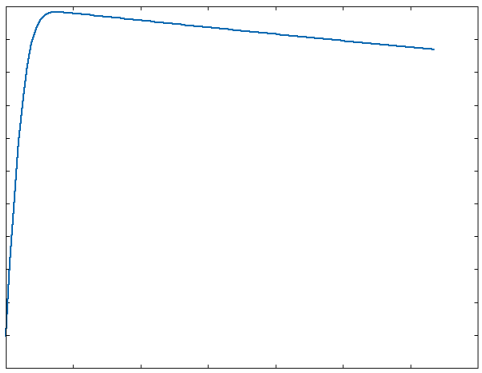
DCAM

This category contains DCAM analogue modelled distortion algorithms of diode, transistor and tube-based circuits. The following graphs show the waveshaping response at 50% and 100% Drive amounts. The x-axis represents time while the y-axis represents amplitude.

GE Diode (Germanium Diode)

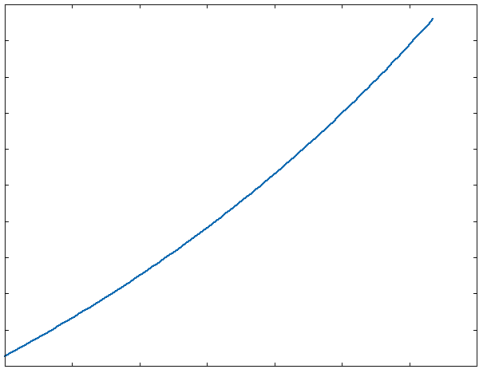


GE Diode: 50% Drive

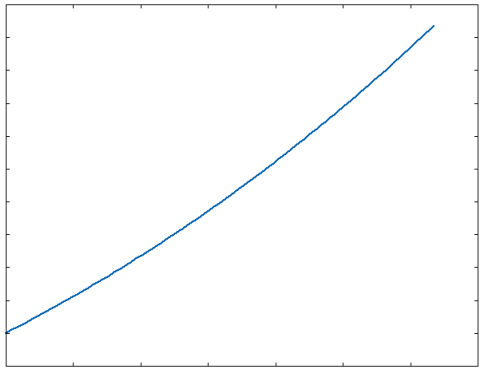


GE Diode: 100% Drive

HR Diode (Half-Rectified Diode)

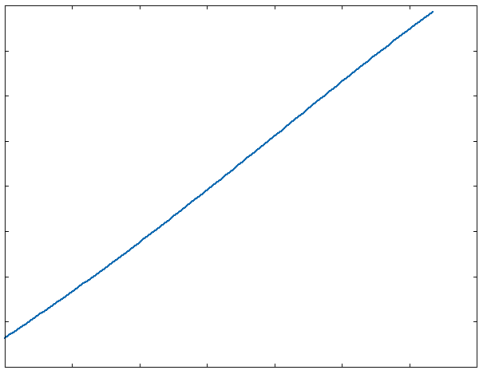


HR Diode: 50% Drive

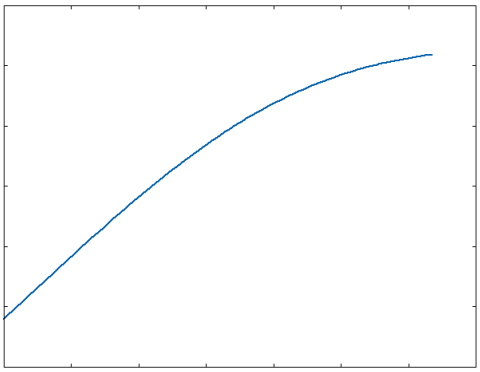


HR Diode: 100% Drive

Op-Amp

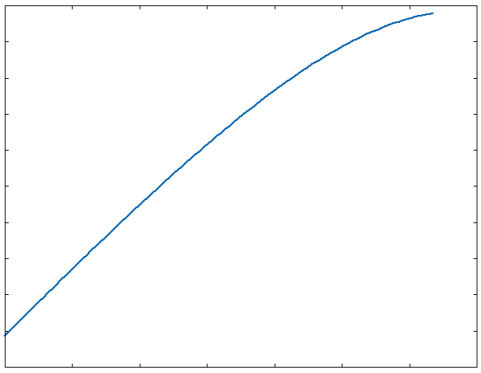


Op-Amp: 50% Drive

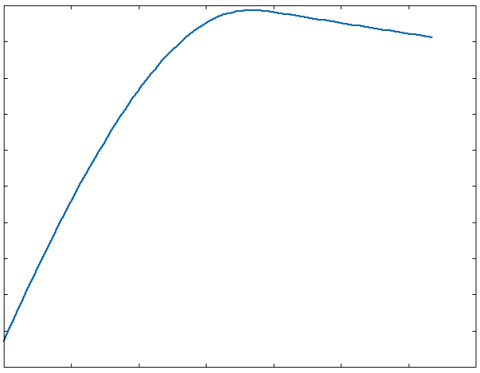


Op-Amp: 100% Drive

JFET (Junction gate Field-Effect Transistor)

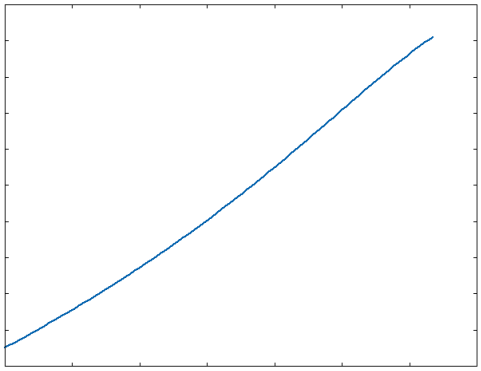


JFET: 50% Drive

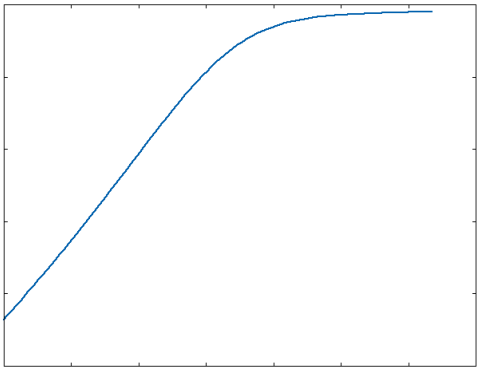


JFET: 100% Drive

Transistor

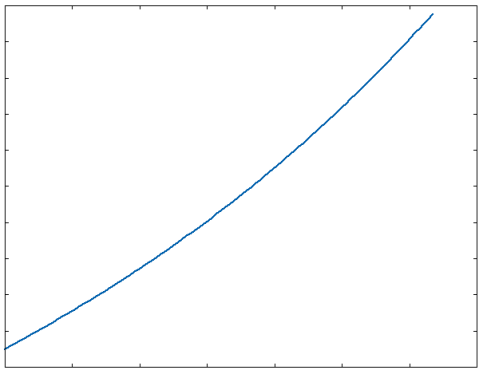


Transistor: 50% Drive

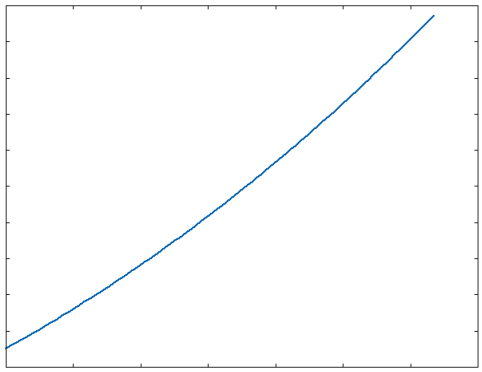


Transistor: 100% Drive

OTA (Operational Transconductance Amplifier)

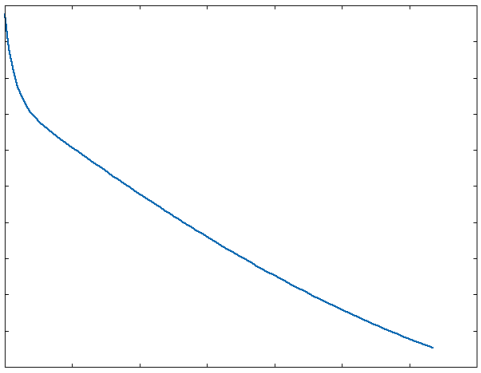


OTA: 50% Drive

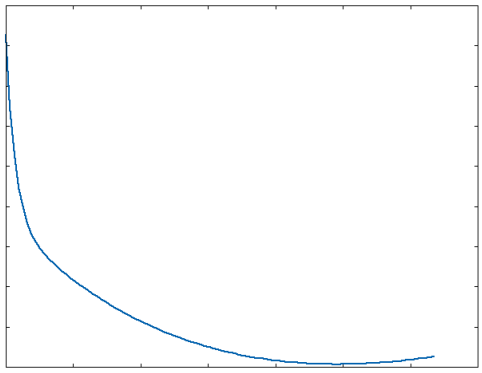


OTA: 100% Drive

Tube



Tube: 50% Drive



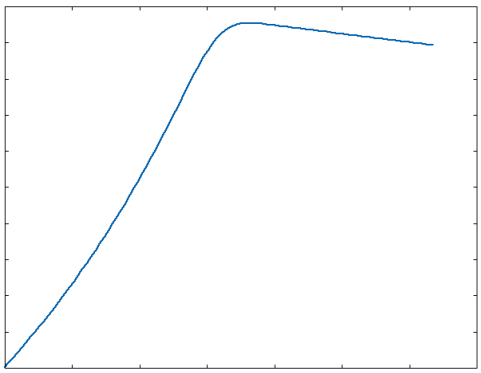
Tube: 100% Drive

Distort

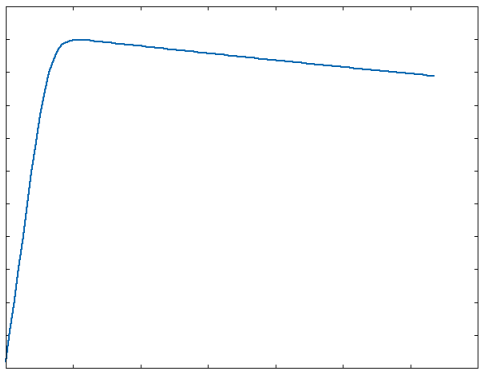
The algorithms in this category introduce inharmonic distortion. The graphs shown represent the frequency response at 50% and 100% drive amounts. TheThe following graphs show the waveshaping response at 50% and 100% Drive amounts. The x-axis represents time while the y-axis represents amplitude.

Diff

This waveshaping function outputs the difference between the incoming audio and a sine-like waveshape.



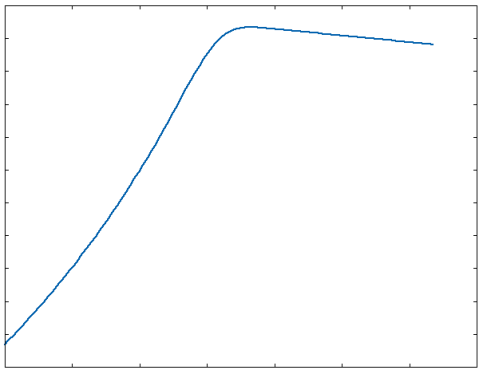
Diff: 50% Drive



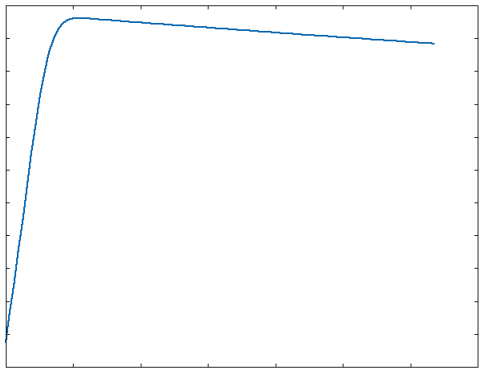
Diff: 100% Drive

Half rect

This algorithm is a half-rectified distortion function.



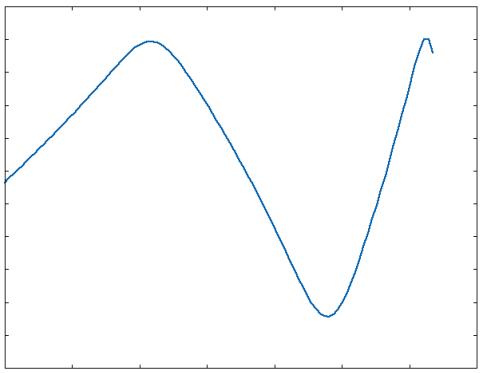
Half rect: 50% Drive



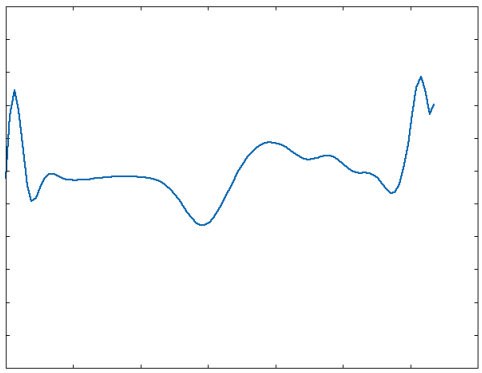
Half rect: 100% Drive

Tri

This algorithm applies a triangle waveshaping function to the incoming audio.



Tri: 50% Drive



Tri: 100% Drive

Ring Mod

These algorithms perform ring modulation of the input signal with a variety of internal carrier waveforms.

RM Sin

Ring modulator with sine wave carrier

RM Tri

Ring modulator with triangle wave carrier

RM Saw

Ring modulator with saw wave carrier

RM Square

Ring modulator with square wave carrier

RM White

Ring modulator with white noise carrier

RM Pink

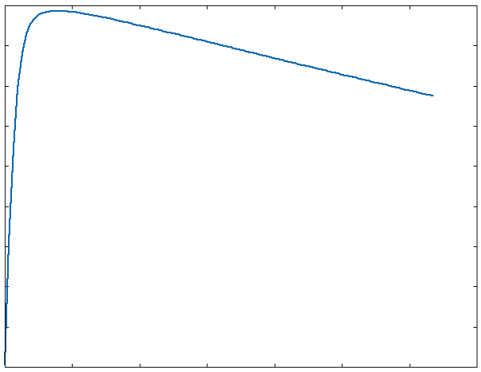
Ring modulator with pink noise carrier

Overdrive

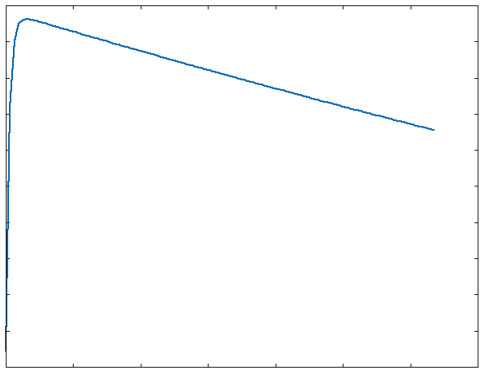
The Overdrive algorithms impart harmonic distortion upon the signal. The following graphs show the waveshaping response at 50% and 100% Drive amounts. The x-axis represents time while the y-axis represents amplitude.

Asym

This algorithm provides an asymmetrical overdrive function.



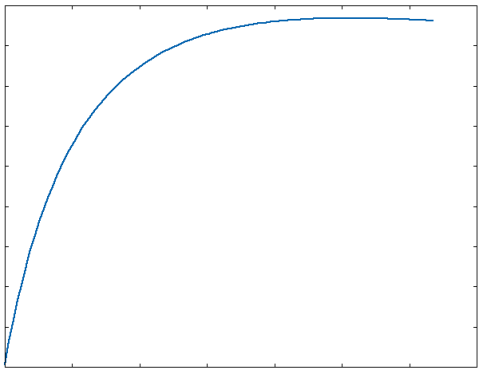
Asym: 50% Drive



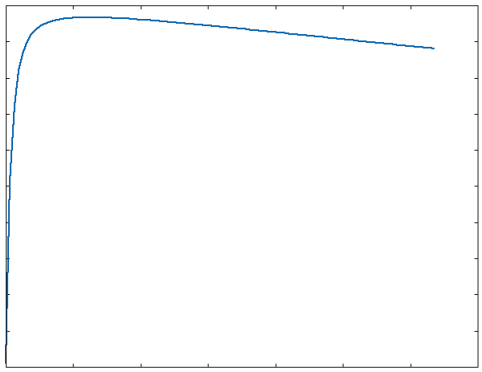
Asym: 100% Drive

Soft

This algorithm provides a soft overdrive function.



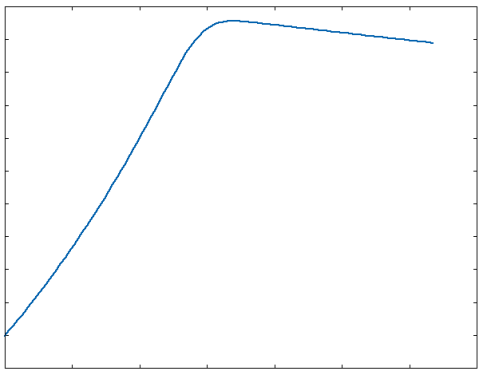
Soft: 50% Drive



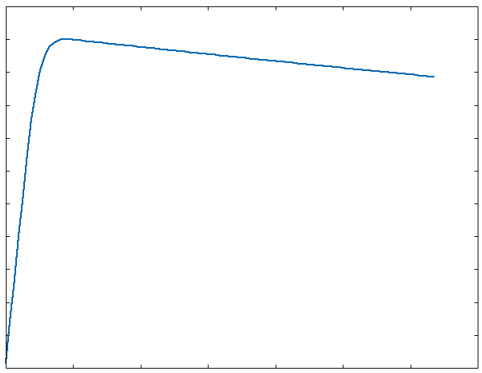
Soft: 100% Drive

Shredder

This algorithm imparts very heavy overdrive to the signal.



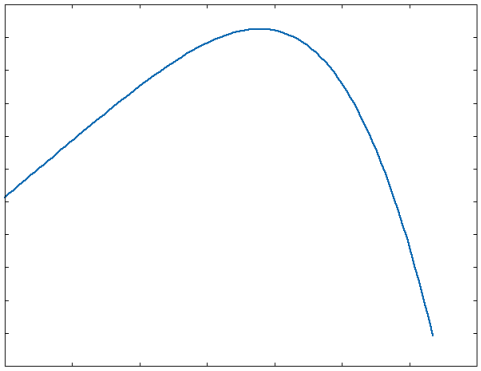
Shredder: 50% Drive



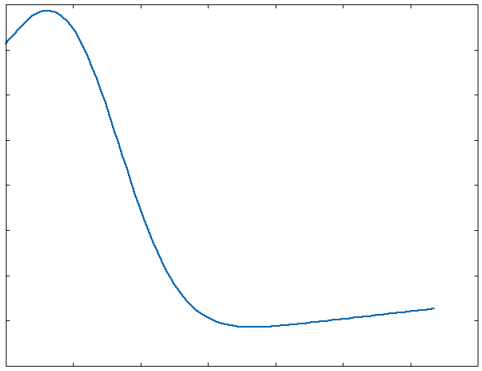
Shredder: 100% Drive

Tannin

This algorithm is essentially a shaper based on a polynomial mathematical function, with added DC shift.



Tannin: 50% Drive

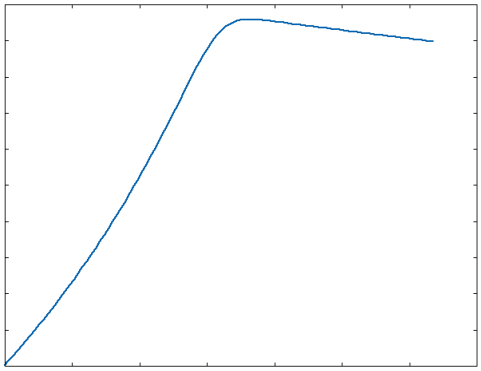


Tannin: 100% Drive

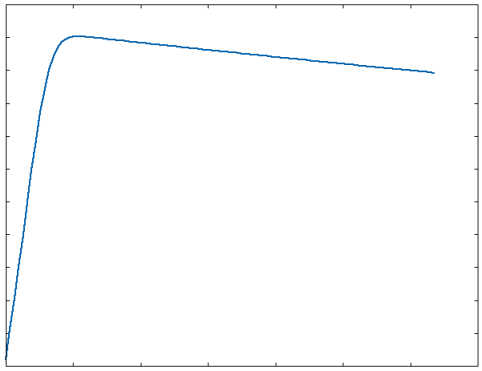
Clipper

These algorithms DC-shift and clip the signal for a hard, abrasive type of distortion. The following graphs show the waveshaping response at 50% and 100% Drive amounts. The x-axis represents time while the y-axis represents amplitude.

Clip

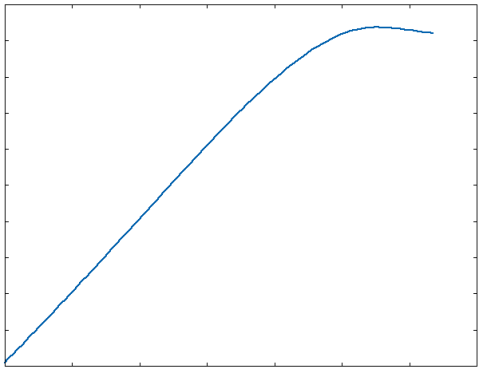


Clip: 50% Drive

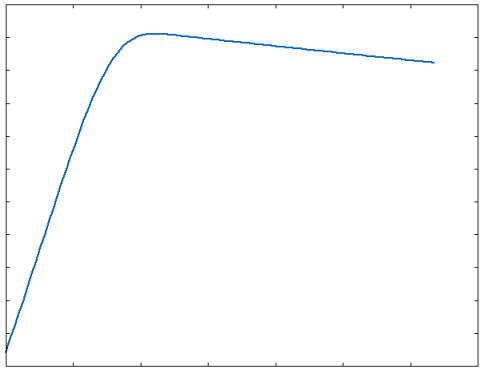


Clip: 100% Drive

Clip Hard

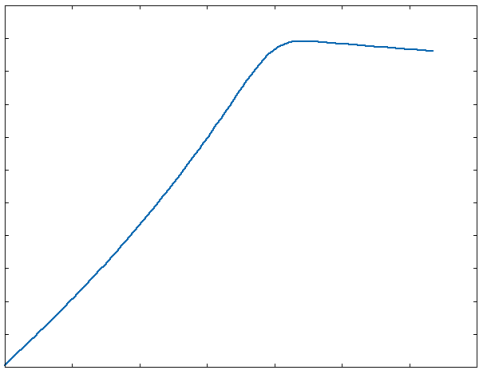


Clip Hard: 50% Drive

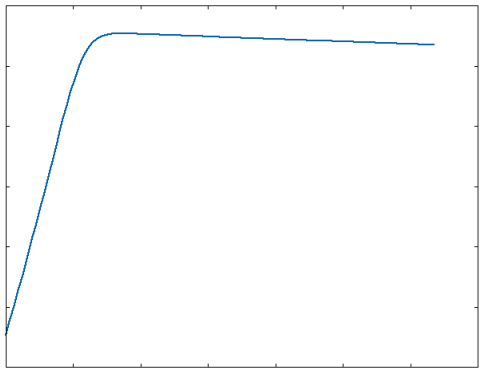


Clip Hard: 100% Drive

Clip Rect

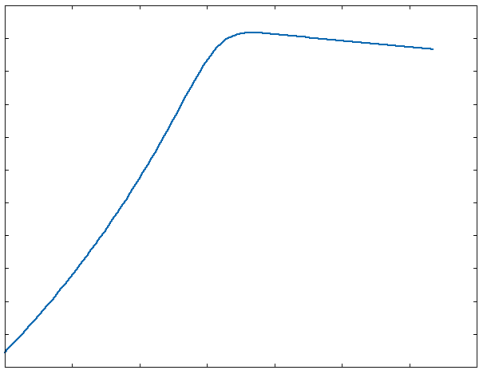


Clip Rect: 50% Drive

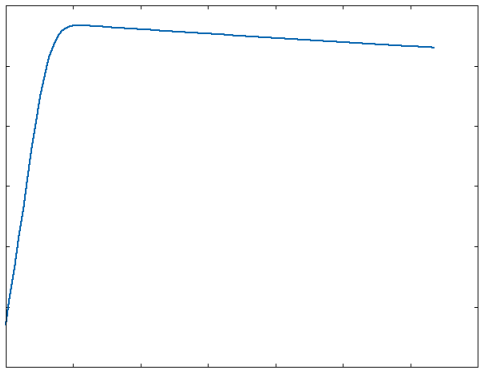


Clip Rect: 100% Drive

Clip Half Rect

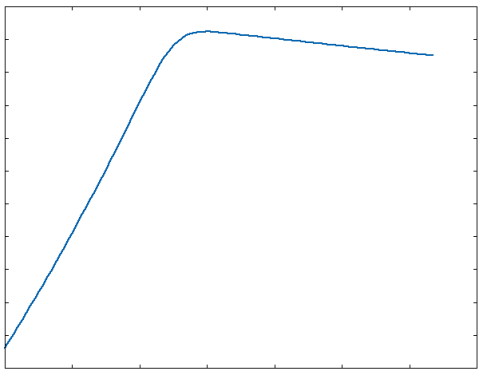


Clip Half Rect: 50% Drive

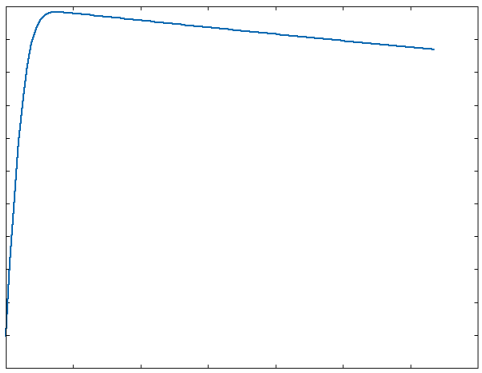


Clip Half Rect: 100% Drive

Clip Quad Rect

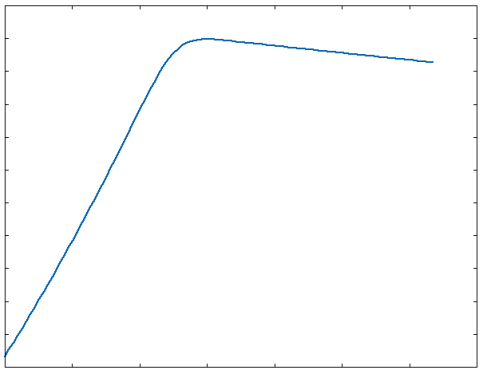


Clip Quad Rect: 50% Drive

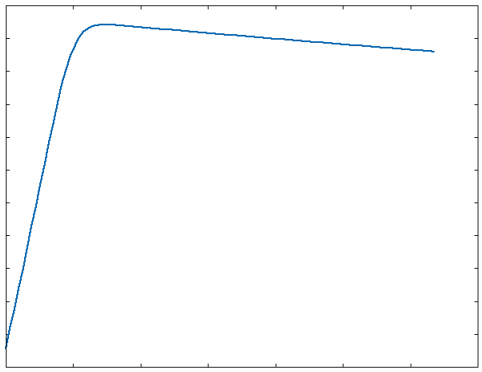


Clip Quad Rect: 100% Drive

Clip Full Rect



Clip Full Rect: 50% Drive

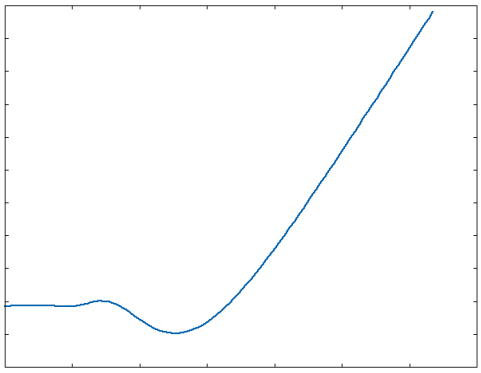


Clip Full Rect: 100% Drive

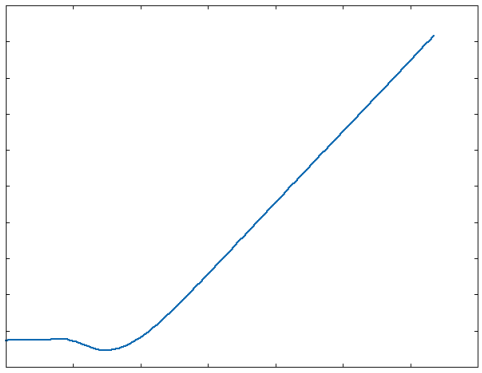
Shaper

These algorithms apply various types of polynomial mathematical waveshaping functions to the audio signal. The following graphs show the waveshaping response at 50% and 100% Drive amounts. The x-axis represents time while the y-axis represents amplitude.

Poly 1

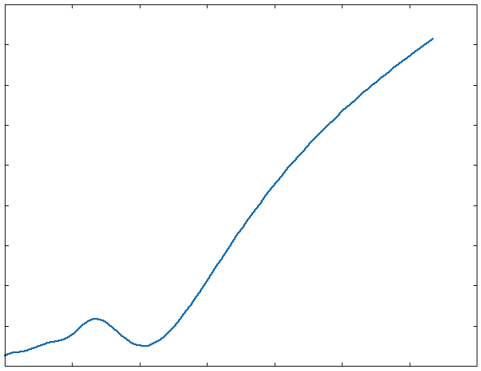


Poly 1: 50% Drive

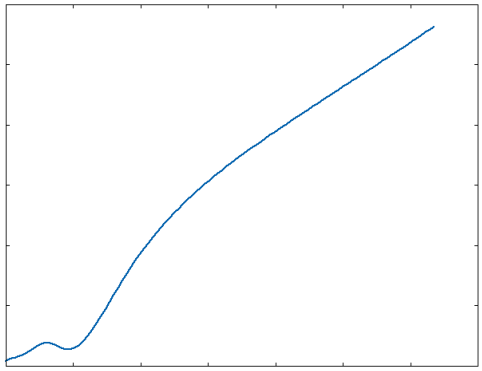


Poly 1: 100% Drive

Poly 2

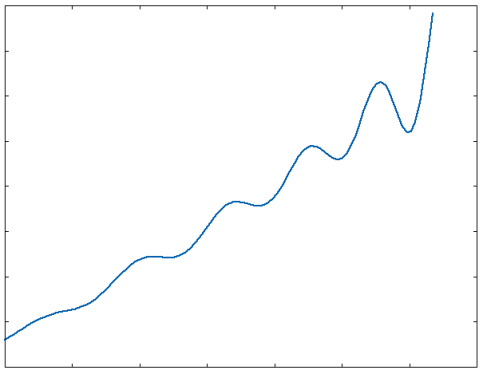


Poly 2: 50% Drive

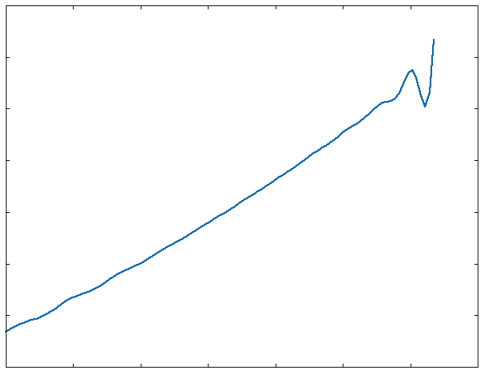


Poly 2: 100% Drive

Poly 3

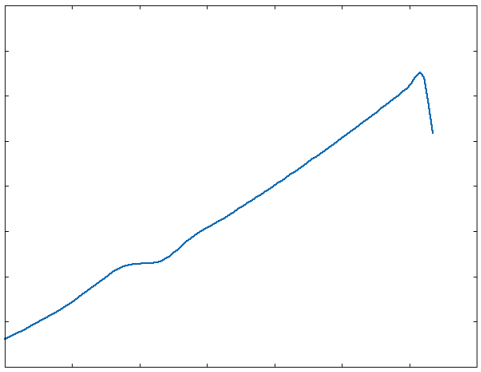


Poly 3: 50% Drive

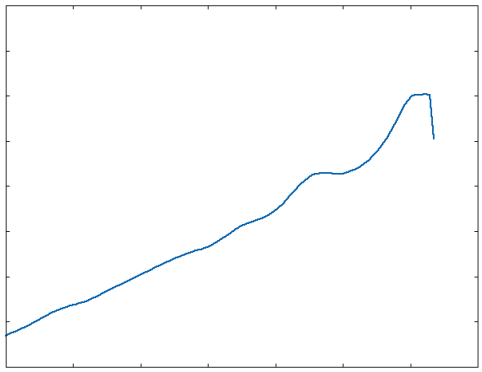


Poly 3: 100% Drive

Poly 4



Poly 4: 50% Drive



Poly 4: 100% Drive

Digital

These algorithms simulate digital distortion caused by reducing the sample-rate and bit-depth of the signal.

Bit Reduce

This algorithm reduces the bit depth of the signal.

SR Reduce

This algorithm reduces the sample-rate of the signal, causing aliasing effects.

3 TransMod modulation

Using TransMod modulation

The TransMod modulation system allows you to route a single modulation source to multiple synthesis and effect parameters, each with its own definable depth.

Modulation depths are represented visually on the parameter itself, rather than in an abstract list of assignments.

TransMod modulation occurs at control rates, in 32-sample blocks.

There are 2 types of 'views' of the synthesis parameters:

Initial Source view (Source)

To activate this view, click the **Source** button (this button is activated by default).

In this view, no modulation depths can be viewed or created. You simply set the initial value of any parameters before any modulation occurs.

TransMod modulation source views

To the right of the Source button are a number of buttons which represent the various TransMod modulation sources that are available.

Clicking any of these buttons means that you can view and create modulation depths from the TransMod source to Maul's parameters. Modulation depths can be seen and set visually on parameters, with indicators showing the current state of the control.

The modulation depth that is set represents the maximum amount of modulation possible from the TransMod source. The changing intensity of the TransMod source, and the combined effect of any other TransMod sources which have been routed to the parameter, dictate the actual modulation that occurs at any one time.

Only one TransMod source 'view' is visible at any one time.

In the following example, **LFO1** is modulating the **Drive** parameter in the Mid drive stage.

The extent of the modulation depth shown represents the maximum amount of possible modulation away from the Source value - in this example, when the LFO has reached its maximum point.

With the Source button selected, no modulation is shown. Note the real-time indicator showing the current value of the Mid stage Drive control.

With the LFO1 TransMod source selected, the destination modulation amount is shown around the Mid stage Drive control.

Adjusting modulation depths

To adjust the modulation depth of a control:

First make sure that the desired TransMod source is selected.

Mouse over the outer ring of the control - notice the cursor has changed.

Click and drag up/down on the outer edge of the control to set the modulation amount.

Controls that cannot be modulated

Most of Maul's parameters can be modulated, although there are some exceptions:

- **Phase** control in LFOs
- All buttons and switches

Real-time modulation indicators

Any modulation that occurs causes a control's actual value after modulation to be shown on controls in real time.

3.1 Further TransMod operations

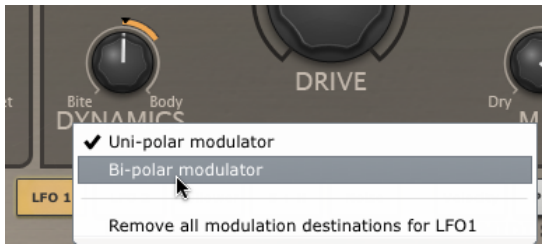
Setting a TransMod source to uni-polar or bi-polar operation

By default, all TransMod modulation sources act as uni-polar sources. In other words, the modulation occurs only in one direction - from the initial Source value towards the maximum modulation value. The modulation depth can be positive (increases the parameter's value) or negative (decreases the value), but not both.

You can also set each source to act in a bi-polar way, so that the modulation occurs in both directions from the initial Source value.

In the following example, LFO1 is shown first as a uni-polar source, modulating the Mid drive stage's **Dynamics** control.

By right-clicking on the LFO1 TransMod button, it is then set to bi-polar mode by clicking on **Bi-polar modulator** in the TransMod source context menu that appears. The modulation then occurs in both directions, as shown by the indicator that moves to show the current value of the parameter after being modulated.



Right-click on the TransMod button and click on 'Bi-polar modulator'

Note the real-time indicator showing the current value as a result of switching to bi-polar mode

To return a modulation source to uni-polar operation, use the **Uni-polar modulator** function on the TransMod source context menu.

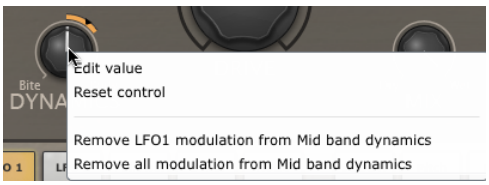
Managing TransMod modulation

Displaying which TransMod sources are modulating a parameter

To see which TransMod sources are modulating a Maul parameter, move the mouse over the control. Any TransMod sources which contain destination modulation depths on the parameter flash on the interface.

Control context menu

Right-click on a Maul parameter to display its context menu, which contains several functions relating to managing TransMod modulation.



Remove modulation from control

Click this function to remove the modulation depth on this control for the currently selected TransMod source.

Remove all modulation from control

Click this function to remove the modulation depths on this control for all TransMod sources that contain modulation depths on it.

TransMod source context menu

Right-click on any TransMod modulation source button to display its context menu. The Uni-polar modulator and Bi-polar modulator functions have been previously discussed.

Remove all modulation destinations

Click this function to remove destination modulation depths for all parameters modulated by this TransMod source.

Adjusting modulation depths with MIDI CCs or host automation

Maul's MIDI Learn system makes it possible to assign controls and controls' TransMod modulation depths to MIDI continuous controllers. This is useful for changing the amount of modulation over time for a specific parameter.

Note: it is also possible to modulate the **Gain** controls for each modulation block to vary the intensity of each of these TransMod sources over time - this varies the intensity of the entire modulation source, which affects all destination parameters being modulated by the source.

3.2 TransMod modulation sources

LFO1 and LFO2

These sources provide the output from LFO1 and LFO2.

Follower (Envelope Follower)

The Follower source provides the output from the Envelope Follower module.

S+H

The S+H source provides the output from the S+H module.

Noise

The Noise source provides a white noise source, quantized to control rate. It provides an constantly changing random source.

Velocity

The Velocity source provides a source generated at every MIDI note-on derived from the note's MIDI velocity. This occurs whenever any MIDI note is received on any MIDI channel.

It is only possible to use the Velocity source when sending MIDI notes to Maul.

Pitch

The Pitch source provides a keyboard tracking modulation source generated from MIDI notes received at Maul's MIDI input.

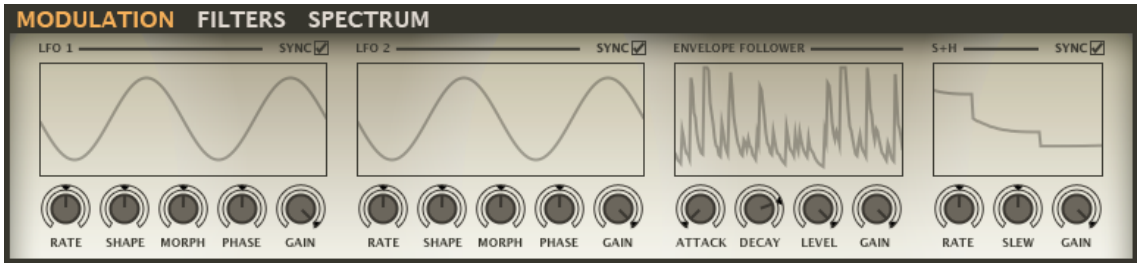
It is only possible to use the Pitch source when sending MIDI notes to Maul.

Rand

The Rand source provides a random value generator for every MIDI note received at Maul's MIDI input, on any MIDI channel.

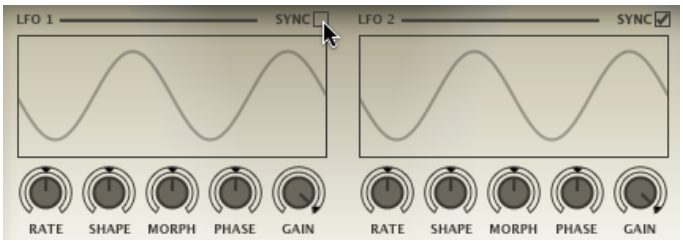
It is only possible to use this source when sending MIDI notes to Maul.

3.3 Maul internal modulators



Maul features several built-in modulation devices with which to animate its parameters, allowing many creative possibilities. There are 2 LFOs, an Envelope Follower and a Sample and Hold. All modulation routing in Maul relies on the TransMod modulation system.

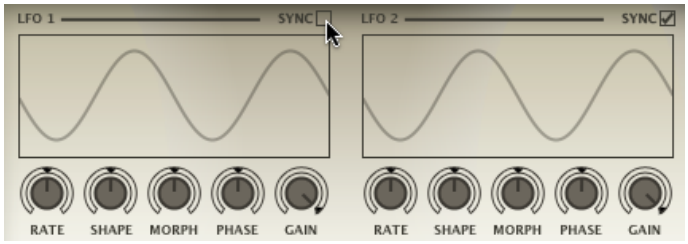
Sync buttons



The LFOs and S+H modules' clocks are synchronized to the host tempo by default.

Click the **Sync** buttons to enable or disable the host tempo sync function for each module.

3.3.1 LFO1 and LFO2



Maul's LFOs can operate at speeds of up to 1024 Hz.

The LFO modules' Visualizers represent the current LFO shape.

Sync button

With the **Sync** button enabled, the **Rate** control is set in BPM values derived from the tempo of the host within which Maul is running.

With the **Sync** button disabled, the **Rate** control is set in Hz.

Rate

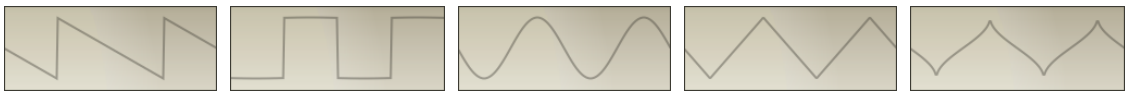
The **Rate** control dictates the speed of the LFO's oscillation.

Maul also features a way of using MIDI notes to switch between sync'd LFO rates on the fly, even with the **Sync** button disabled.

Shape

The **Shape** control morphs the shape of the LFO continuously through various waveform shapes.

At the default setting of 50%, the LFO shape is a sine wave.



LFO Shape 0% | LFO Shape 25% | LFO Shape 50% | LFO Shape 75% | LFO Shape 100%

Morph

The **Morph** control shifts the centre point of the waveform without altering the wavelength. It is similar to a pulse width control in that it varies the duty cycle of the waveform.

Phase

The **Phase** control allows you to adjust the phase of the LFO within 360 degrees.

Note: This control cannot be modulated with the TransMod system.

Gain

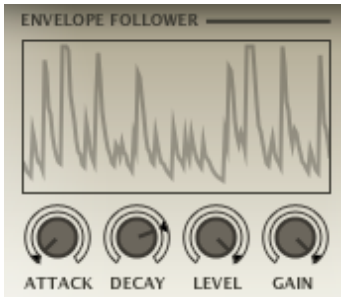
The **Gain** control offers a final attenuation control for the output of the module before it enters the TransMod modulation system. At 100%, no attenuation is applied to the output modulation signal.

This control is intended to be modulated by other TransMod sources, in a similar way to using a VCA to scale one modulation source with another in an analogue modular system.

MIDI note functions

Maul's LFOs respond to incoming MIDI notes on channel 1 for resetting to the start phase and for setting various sync'd LFO times. These functions are summarized in the Advanced MIDI section.

3.3.2 Envelope Follower



Maul's envelope follower reacts to the amplitude of the input signal to create a series of attack-decay envelopes which are used as modulation signals in the TransMod system. Try using the Follower source to modulate the filter Cutoff and Drive parameters in the distortion stages.

The Envelope Follower module's Visualizer represents the real-time output of the module.

Attack

This control sets the **Attack** time of the envelope generated in response to a new detected transient.

Decay

This control sets the **Decay** time of the generated envelope.

Level

The **Level** control allows you to attenuate the level of the signal entering the envelope follower transient detection circuit. At 100%, no attenuation is applied on the signal.

Gain

The **Gain** control offers a final attenuation control for the output of the module before it enters the TransMod modulation system. At 100%, no attenuation is applied to the output modulation signal.

This control is intended to be modulated by other TransMod sources, in a similar way to using a VCA to scale one modulation source with another in an analogue modular system.

3.3.3 Sample+Hold (S+H)

Maul's Sample and Hold (S+H) function is designed to output a stream of varied modulation values which are produced by taking the value ('sampling') of a dedicated internal noise source when it receives a pulse from its internal clock. The value is 'held' constant until the next clock pulse occurs.

It effectively performs the function of a 'random LFO'.

The S+H module's Visualizer represents the real-time output of the module.

Sync button

With the **Sync** button enabled, the **Rate** control is set in BPM values derived from the tempo of the host within which Etch is running.

With the **Sync** button disabled, the **Rate** control is set in Hz.

Rate

The S+H function is driven internally by a series of pulses called a clock, the speed of which is dictated by the **Rate** control. When a clock pulse occurs, the dedicated internal noise signal is 'sampled' - its current value is 'snapshotted' - and held constant at the sampled value until the next clock pulse, when the process repeats.

Slew

The **Slew** control introduces lag between each sampled and held value, resulting in a smoother transition between values instead of abrupt changes with the control at the minimum setting.

Gain

The **Gain** control offers a final attenuation control for the output of the module before it enters the TransMod modulation system. At 100%, no attenuation is applied to the output modulation signal.

This control is intended to be modulated by other TransMod sources, in a similar way to using a VCA to scale one modulation source with another in an analogue modular system.

4 MIDI functions

Maul features extensive MIDI control features for interacting with its parameters in real time.

MIDI control with Maul is *host-dependent*. Some hosts make it very easy to route MIDI notes and/or continuous controllers to an effect plugin, but in some it may be necessary to run Maul as an instrument or MIDI-controlled effect on a separate channel and route the desired audio to its input(s).

Please consult your host's documentation for full details of its MIDI implementation for audio effect plugins.

Maul features 2 kinds of MIDI control:

MIDI CC input

Maul allows the ability to assign MIDI CC (continuous controller) messages to the following:

- its parameters
- parameter modulation amounts from individual TransMod modulation sources.

See the MIDI Learn section for full details on Maul's MIDI mapping functions.

MIDI note input

Maul responds to MIDI note input for retriggering and setting LFO rates as well as for generating several TransMod modulation sources. See the Advanced MIDI section for more details.

4.1 MIDI Learn mode

Maul's MIDI Learn mode allows you to map MIDI CCs (continuous controllers) to remotely control parameters and to parameter modulation depths from TransMod sources. Sending MIDI to Maul is *host-dependent*.

MIDI Learn CC setups are saved with the host project containing Maul. They are not saved within individual Maul presets (saved using the Preset picker).

Mapping a MIDI CC to a control

1. Click the MIDI Learn button to enter Learn mode. Parameters in Maul which can be mapped to MIDI CCs are highlighted in green. Note that no TransMod modulation source is currently selected.

2. Click the parameter you want to map on the Maul interface.

3. Move the physical MIDI CC knob, slider or other controller you want to use.

4. The parameter is now mapped. The MIDI channel and CC number are overlaid on the control.

5. Click the MIDI Learn button again to exit Learn mode.

Removing a MIDI Learn assignment

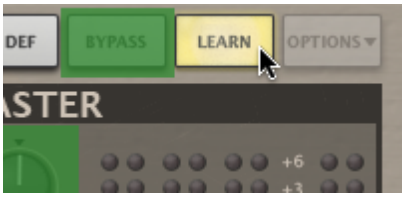
1. While in MIDI Learn mode, click the 'X' button above each assigned control.

2. The assignment is now removed.

Mapping a MIDI CC to a control's modulation depth for a TransMod source

It is possible to assign individual controls' TransMod modulation depths to MIDI CCs. This is useful for changing the amount of modulation over time for specific parameters.

1. Click the desired TransMod modulation source button.



2. Click the MIDI Learn button to enter MIDI Learn mode.

3. Click the parameter you want to map on the Maul interface.

4. Move the physical MIDI CC knob, slider or other controller you want to use.

5. The parameter's modulation depth for the current TransMod source is now mapped. The MIDI channel and CC number are overlaid on the control.

6. Click the MIDI Learn button to exit MIDI Learn mode.

4.2 Advanced MIDI functions and the MIDI panel

Maul responds to MIDI note input in a variety of performance-oriented ways. You can define a separate MIDI channel for each of these types of MIDI input control using the MIDI panel located in the Options menu.

Sending MIDI to Maul is *host-dependent*.

LFO control

Both LFOs respond to MIDI note input for retriggering their phase and for setting their rate to BPM-based values.

The following MIDI note octave numbers assume that C-2 is the lowest MIDI note (MIDI note 0).

Note	Note no.	Function
D-2	2	Retrigger LFO1 module
D#-2	3	Retrigger LFO2 module
F-2 to G1	5-43	LFO1 Rate: 64 bars (dotted) to 1/64th note (triplet) [also retriggers LFO1 phase]
G#1 to A#4	44-82	LFO2 Rate: 64 bars (dotted) to 1/64th note (triplet) [also retriggers LFO2 phase]

Generation of Pitch, Velocity and Random TransMod sources from MIDI notes

MIDI note input is used for generating several modulation sources within the TransMod system.

Pitch

MIDI note pitch is converted to the Pitch keyboard tracking source at every note-on.

Velocity

MIDI note velocity is converted to the Velocity source at every note-on.

Random

A random number is generated when every MIDI note-on is received.

MIDI panel

The MIDI panel is evoked using the Options menu. It allows you to choose which MIDI channels to use for various MIDI functionality.

LFO MIDI Channel

This allows you to set the MIDI channel for MIDI notes for retriggering and setting LFO rates. You can set this to channels 1-16 or Omni for all channels.

Pitch MIDI Channel

This allows you to set the MIDI channel for MIDI notes to generate the Pitch TransMod source. You can set this to channels 1-16 or Omni for all channels.

Velocity MIDI Channel

This allows you to set the MIDI channel for MIDI notes to generate the Velocity TransMod source. You can set this to channels 1-16 or Omni for all channels.

RND Retrigger MIDI Channel

This allows you to set the MIDI channel for MIDI notes to generate values for the Random TransMod source. You can set this to channels 1-16 or Omni for all channels.

Apply

Click this button to apply the new settings and exit the MIDI panel.

Store as default

Click this button to store the current settings as the defaults used when launching an instance of the Maul plugin.

Cancel

Click this button to cancel any changes to the previous settings and exit the MIDI panel.